

CLAIM LISTING

1. (Previously Presented) A system for improved simulation of a biological system comprising a plurality of chemical reactions, the system comprising:

a storage; and

a processor configured to:

construct a composite graphical model of a biological system including a first chemical reaction and a second chemical reaction, the composite graphical model having components described by at least two different types of mathematical models and including a specified constraint provided in addition to the first and second chemical reactions that constrains dynamic behavior of the biological system,

accept as input the constructed composite graphical model of the biological system,

execute the composite graphical model to generate as output dynamic behavior of the biological system using a first type of computational model for the first chemical reaction, and a second type of computational model for the second chemical reaction, and the specified constraint, the executing involving evaluating the at least two different types of mathematical models, and

store the dynamic behavior of the biological system in the storage.

2. (Previously Presented) The system of claim 1 wherein the graphical model is a block diagram model of the biological system.

3. (Previously presented) The system of claim 2 wherein the processor is further configured to provide at least one block identifying a set of related chemical reactions.

4. (Previously presented) The system of claim 1 wherein the processor is further configured to provide a graphical user interface for accepting user commands and data.

5. (Previously presented) The system of claim 1 wherein the first type of computational model is selected from the group consisting of ordinary differential equation analysis, partial

differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

6. (Previously presented) The system of claim 5 wherein the second type of computational model is selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

7. (Previously presented) The system of claim 1 wherein the second type of computational model is selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

8. (Previously presented) The system of claim 1, wherein the processor is further configured to display the dynamic behavior of the biological system.

9. (Previously Presented) An improved method for simulation of a biological system including a first chemical reaction and a second chemical reaction, the method comprising:

constructing, using a computing device, a composite graphical model of the biological system including the first chemical reaction and the second chemical reaction, the composite graphical model having components described by at least two different types of mathematical models and including a specified constraint provided in addition to the first and second chemical reactions that constrains dynamic behavior of the biological system;

executing, using the computing device, the composite graphical model to generate dynamic behavior of the modeled biological system using a first type of computational model for the first chemical reaction, a second type of computational model for the second chemical reaction and the specified constraint, the executing involving evaluating the at least two different types of mathematical models; and

storing the dynamic behavior of the modeled biological system in a storage device.

10. (Previously presented) The method of claim 9 wherein constructing further comprises:
constructing a block diagram model of the biological system.

11. (Original) The method of claim 10 wherein the block diagram model includes at least one block identifying a set of related chemical reactions.

12. (Previously presented) The method of claim 9 wherein constructing further comprises:
accepting user commands and data; and
constructing the graphical model of the biological system using the user commands and data.

13. (Previously presented) The method of claim 9 wherein generating further comprises:
generating an expected result of the first chemical reaction using a computational model selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis; and
generating an expected result of the second chemical reaction.

14. (Previously presented) The method of claim 9 wherein generating further comprises:
generating an expected result of the first chemical reaction; and
generating an expected result of the second chemical reaction using a computational model selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

15. (Previously presented) The method of claim 9 further comprising displaying an expected result of the first chemical reaction or the second chemical reaction.

16. (Previously Presented) An article of manufacture having embodied thereon computer-readable instructions for improved simulation of a biological system comprising a plurality of chemical reactions, the article of manufacture comprising:
computer-readable instructions for constructing, using received user commands and data, a composite graphical model of a biological system including a first chemical reaction and a second chemical reaction, the composite graphical model having components described by at

least two different types of mathematical models and including a specified constraint provided in addition to the first and second chemical reactions that constrains dynamic behavior of the biological system;

computer-readable instructions for executing the constructed composite graphical model of the biological system to generate dynamic behavior of the modeled biological system using a first type of computational model for the first chemical reaction, a second type of computational model for the second chemical reaction, and the specified constraint, the executing involving evaluating the at least two different types of mathematical models; and

computer-readable instructions for storing the dynamic behavior of the modeled biological system in a storage.

17. (Previously presented) The article of manufacture of claim 16 further comprising computer-readable instructions for displaying the dynamic behavior that is generated.

18. (Previously presented) The article of manufacture of claim 16 wherein the computer-readable instructions for constructing a graphical model of the biological system comprises computer-readable instructions for constructing a block diagram model of the biological system.

19. (Previously presented) The article of manufacture of claim 16 wherein the computer-readable instructions for constructing a block diagram model of the biological system includes computer-readable instructions for constructing at least one block identifying a set of related chemical reactions.

20. (Previously presented) The article of manufacture of claim 16 wherein computer-readable instructions for generating dynamic behavior of the modeled biological system comprises computer-readable instructions for generating an expected result of the first chemical reaction using a computational model selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

21. (Previously presented) The article of manufacture of claim 16 wherein computer-readable instructions for generating dynamic behavior of the modeled biological system comprises

computer-readable instructions for generating an expected result of the second chemical reaction using a computational model selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

22. (Previously presented) The article of manufacture of claim 16 further comprising computer-readable instructions for displaying an expected result of the first chemical reaction or the second chemical reaction.

23-44. (Canceled)

45. (Previously Presented) A system for simulation of a biological system including a first chemical reaction and a second chemical reaction, the system comprising:

means for constructing a composite graphical model of the biological system including a first chemical reaction and a second chemical reaction, the composite graphical model having components described by at least two different types of mathematical models and including a specified constraint provided in addition to the first and second chemical reactions that constrains dynamic behavior of the biological system;

means for executing the composite graphical model to generate dynamic behavior of the modeled biological system using a first type of computational model for the first chemical reaction, a second type of computational model for the second chemical reaction, and the specified constraint, the executing involving evaluating the at least two different types of mathematical models; and

means for storing the dynamic behavior of the modeled biological system in a storage.

46. (Previously Presented) A computer-readable storage medium holding computer-executable instructions for simulation of a biological system, the medium comprising one or more instructions for:

constructing a composite graphical model of the biological system having components described by at least two different types of mathematical models and including a first chemical reaction and a second chemical reaction in the biological system;

calculating putative reaction times for execution of the first chemical reaction and the second chemical reaction in the graphical model;

sorting the putative reaction times;

executing one of the first chemical reaction and the second chemical reaction identified by a first reaction, the first chemical reaction being executed using a first type of computational model concurrently with the second chemical reaction being executed using a second type of computational model;

recalculating the putative reaction times for the first chemical reaction and the second chemical reaction after the executing of the one of the first type of computation model or the second type of computational model;

sorting the recalculated putative reaction times; and

recalculated and sorted putative reaction times in a storage.

47. (Previously presented) The medium of claim 46, further comprising:

instructions for iterating execution of the instructions for executing, the instructions for recalculating and the instructions for sorting the recalculated putative reaction times until a final simulation time has been reached to generate a dynamic behavior of the modeled biological system.

48. (Previously Presented) The method of claim 9, further comprising:

annotating the composite graphical model in response to a user requesting to add annotations to the model that are provided by the user.